SOIL conservation

U. S. Department of Agriculture / Soil Conservation Service / April 1975

From the Administrator

New Opportunities for Women

In support of International Women's Year 1975 and the Federal Women's Program, the Soil Conservation Service has redoubled efforts to employ and promote women to jobs of responsibility in all areas of our work.

As 1974 ended, a total of 43 women were holding jobs in professional fields in the Service that used to be held exclusively by men. While the number is not yet large, it is twice what it was a year ago, and that is a sign of genuine progress.

SCS women in professional jobs include an urban planner, a landscape architect, engineers, soil scientists, soil conservationists, economists, cartographers, accountants, and an operations researcher.

In addition, we currently have 28 student trainees who are women. They are working in the fields of soil conservation, soil science, and engineering.

In the administrative field, two SCS firsts for women include an assistant state administrative officer and a state budget and finance officer.

The number of women serving as public information specialists and officers in SCS state offices also has taken a jump—from 1 to 10 in less than 5 years.

But SCS will not be content with these modest gains. We intend to see women advance into the mainstream of SCS positions.

One way we hope to accomplish this is through the Upward Mobility Program, a tool for moving women from clerical and secretarial jobs to paraprofessional positions. This program now includes a college study program, on-the-job training opportunities, and adjusted tours of duty to permit attendance at local universities. We are doing our best to publicize these opportunities among employees, but women also have a responsibility—to avail themselves of opportunities as they arise.

Helping to spread the word about opportunities in SCS through workshops and career counseling is the Federal Women's Program Coordinator selected in each SCS state office and in the Washington office.

Other SCS actions in support of broader opportunities for women include—

- Holding week-long courses at SCS training centers on "Women in Federal Service." About one-fourth of the students so far have been men, since they also need to understand the changing role of women in government.
- Encouraging more and more colleges and universities to expand or improve their curricula to enable more women and minority students to qualify for SCS positions.
- Providing a series of conservation orientation tours for employees, primarily women, who work in the Washington, D.C., office and get little opportunity to see the way we work in the field.

These are some of the things we are doing to get more high-quality women employees into the Service and to give them continuing opportunities for advancement after they join us. That objective has our full commitment in the years ahead.

Kenneth E. Grant

SOIL conservation

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COVER: This month's cover is a special one—it was the first cover of **Soil Conservation** magazine 40 years ago. The Soil Conservation Service marks its 40th anniversary on April 27—the date on which the legislation passed by the 74th Congress became Public Law 46—"To provide for the protection of land resources against soil erosion, and for other purposes." See story on page 21.

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Earl L. Butz
Secretary of Agriculture

Kenneth E. Grant, Administrator
Soil Conservation Service

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Sucker Brook is one of the areas recommended for a pilot agricultural drainage and flood control project in a river basin report prepared by the St. Lawrence River Regional Water Resources Planning Board.

'One of the Last Frontiers of the East'

by Vincent J. Price
Information Division, SCS, Washington, D.C.

With the American farmer pressed to meet increasing U.S. and world demand for food and fiber, discovery of a previously overlooked region with prime agricultural potential is undoubtedly a find of great importance. U.S. Department of Agriculture and New York Department of Environmental Conservation people have located just such a region. Its potential was discovered through a river basin study of upstate New York.

For hundreds of years farmers in the St. Lawrence River Valley of New York agreed: the land there was practically worthless for farming. The season was too short; the soil too poor; the land too wet; and the climate too cold. For 150 years farmers from the Mohawk Valley and the Hudson moved west, settling in Ohio and Wisconsin, in the Prairie and the Great Plains. The St. Lawrence Valley, separated from the rest of the country by the forested Adirondack Mountains, remained in low intensity dairying and woodland.

Then in the 1960's, a combination of factors began to make people take another long close look at the land resources of the St. Lawrence. Instrumental in the process was a USDA Type IV river basin study undertaken under Section 6, Public Law 566.

This study was part of the Eastern New York River Basin Survey, which in turn is part of a cooperative federal-state program to inventory land and water resources throughout New York State. The studies are coordinated by the New York State Department of Environmental Conservation.

USDA assistance from the Soil Conservation Service, Forest Service, and Economic Research Service includes analyses of those individual watersheds which have potential for development of their water and related land resources.

"We write brief reports with

specific technical information referring to the watersheds," explains SCS's watershed planning party leader for New York, Eudell F. Bivens.

"People can relate to their own watersheds sometimes while they can't relate to the Oswego or the Susquehanna river basin—vast basins such as these are too large compared to the geographic interests of an individual citizen.

"For the St. Lawrence study, we went in with a contingent of men for every possible discipline in which we have technical expertise. After about a week, we identified potential problems. We made detailed studies, called watershed investigation reports (WIR's), of typical watersheds for flooding, drainage, and other problems."

What the specialists found surprised them.

"The North Country is one of the last frontiers of the East, one of the last areas with large acreages of open country readily available for farming," reports SCS District Conservationist Dave Stockbridge. "The watersheds studied here under the river basin survey have high agricultural potential, but due to poorly drained conditions, the land is used only for low intensity farming, with low profits."

Although there are extensive wetlands in the basin, none of the land under consideration is permanently under water. It is inundated in the spring, in the fall, and after rainstorms in the growing season. Because of the spring inundation, the growing season is drastically reduced, simply because farm machinery can't operate in the mud and the soil can't warm up.

"The county is abundant in clays and silty clay soils of high natural fertility," says Stockbridge, "but removal of surface water is necessary before you can produce anything more than grass."

For example, one of the watersheds studied was Squeak Brook. SCS found that if the lands with high agricultural potential in the Squeak Brook Watershed were drained and protected from flooding, an average acre could yield 100 bushels of grain corn, 17,000-17,500 pounds of potatoes, 1.4 tons of snap beans, 19.5 tons of processed beets, 454 crates of cauliflower (each crate containing 12 heads), 2.8 tons of processed sweet corn, 25 tons of processed cabbage, 165 bushels of cucumbers, 2.5 tons of processed peas, or 8.2 tons of processed spinach.

"Compared with the $2.17 net return per acre currently being realized" in the watershed, the Squeak Brook WIR reports, "the benefits of the project vary from around $10 per acre for present land use with only drainage improvement and flood control as inputs to more than $100 per acre for using the suitable protected land for potatoes."

The question could be raised, if the land is so good, why hasn't any farmer already drained it? The answer is that the streams of the basin slowly drain into the St. Lawrence River, and until a watershed as a whole unites to create a common outlet for its drainage, conventional on-farm drainage may not be adequate to assure a successful crop.

"In northern New York, the land is all in little pockets," explains Dr. Madison Wright, dean of the College of Agriculture and Life Sciences at Cornell University. "If an individual feels like making an improvement, he may not have an outlet. If his neighbor doesn't also want to solve the problem or provide an outlet, his efforts are wasted."

Before the land—an estimated 200,000 to 800,000 acres—could be safely utilized, coordinated drainage projects would have to be carried out, and hard choices between conflicting land uses may have to be made.

Bob Thompson is a farmer on the Sucker Brook Watershed in St. Lawrence County. He's installed some drainage on his farm but he still lacks an adequate outlet.

"Of the 200 acres on my farm, 10 to 20 percent didn't need drainage," he reports. "Eighty to 90 percent needed drainage before we could be sure of getting a crop, and it's not all done yet. I'd like to put corn into one area, but it's poorly drained.

"We had places where in June you'd walk in water halfway up to your knees. We take a tractor out and get stuck; we take a second tractor out to get the first one and almost get stuck again. There's a field next door where nothing's been done and there's some water on it now, in mid-June.

"This creek, Sucker Brook, supposedly drains into the St. Lawrence, but it really sits full of water all summer. In spite of all the hot weather, this creek will never get lower. For that reason, if it rains, the drainage ditches all fill up with water.

"Right now we try to produce all our own roughage. In the future, we hope to also produce our feed grain. If we can get corn in the first of May instead of the 20th, it'll mature; we could grow it for grain instead of for silage.

"The problems are the same all over here. There are probably a dozen or so of us that would be affected if we could get a watershed plan imple-

mented. It's high potash soil here; it's high lime soil; and if we can get the water off of it, we'll get real good use out of it."

It was the river basin survey which brought the complex situation in the North Country to light.

"No one knew anything about the resources there," explains SCS's Bivens. "No one had really explored the possibilities of drainage on a sand-over-clay or a clay-over-sand soil. We chose three farms with typical soils: clay, clay over sand, and sand over clay, and then developed a detailed water management plan for each of these farms. We explained in dollars and cents what a farmer could get from drainage and what drainage would cost."

The St. Lawrence River Regional Water Resources Planning Board, in preparing the river basin report, recommended that pilot agricultural drainage and flood control projects be undertaken in the basin, naming Squeak Brook, Sucker Brook, and the Naumberg area as three possible watersheds for such a project.

"The local soil and water conservation districts should make application through the newly established Black-St. Lawrence Resource Conservation and Development Project," the river basin report recommended. "The Cooperative Extension Service and the Cornell College of Agriculture and Life Sciences should be requested to help the district organize the landowners and support the project. The state and county should share the nonfederal cost."

Whether such a pilot project will be undertaken remains to be seen, but according to Dr. F. N. Swader of Cornell, it would be the logical next step.

"We're working for that end," he said. "This should involve both installation of the project and documentation of the changes that take place. We feel that documentation of the changes would make it of maximum utility."

The existence of valuable wildlife resources will make a land use decision even more difficult.

"We have extensive acreages of Class III, IV, and V wetlands," Stockbridge said. "We're in the principal Eastern flyway for waterfowl. It should be emphasized that there is a big difference between wet land and wetlands—we're in no way talking about draining wetlands." There are also valuable recreation areas in the basin, including large areas in the Adirondack State Park.

S. K. Wright, assistant executive secretary of the New York State Soil and Water Committee, agrees.

"We're talking about enhancement of present land use, not wetland development," he said, but suggests that the land use conflicts will still be there.

"You're talking about channelization vs. fish and wildlife development, about agricultural drainage in an area with tremendous agricultural potential—there are no easy answers. We need first to gather the kinds of information on a river basin that are essential to make decisions on water management."

Bivens cautions that even drainage of agricultural lands could have very significant environmental impacts on adjacent or nearby wildlife areas. "There's a tremendous amount of wildlife acreage up there and the environmental aspects of drainage will have to be worked out before you decide to go ahead and enhance the farmlands," he said.

But at least, whatever land use decisions are made in the St. Lawrence Basin will be made from a knowledgeable standpoint. "The levels of water resource understanding jumped tremendously as a result of the river basin survey," reports Wright. "Helping local leaders understand the problems was a main benefit of river basin surveys in New York."

Factors which support favorable consideration for more intensive agricultural development include the spotted distribution of the areas favorable for crop production. No large areas should be drained. The edge effects created by different land uses and the increased food production for wildlife would tend to counterbalance any damage to adjacent wildlife lands which might occur. In any case, any potential development would be planned to result in minimum adverse impacts on adjacent wetlands dedicated to wildlife use.

In the future, the information generated by the river basin survey of this agricultural frontier may have a significant effect on America's continuing role as the foremost world farmer.

"The competition for land from urban uses continually enhances the North Country," said Henry Wadsworth, associate director of Extension Service at Cornell. "The U.S. posture in respect to world food will also affect the prospects for the North Country. If a lot of our production in the Midwest goes for export, a lot of our North Country agricultural potential will have to be met."

For the present, the myth of the worthless North Country has been dispelled. ♦

Halifax Maidencane— A Plant To Protect Shorelines

by T. A. Bown

Plant materials specialist, SCS, Jackson, Mississippi

An aquatic grass, Halifax maidencane is successfully controlling shoreline erosion on ponds, lakes, and irrigation reservoirs in Arkansas, Louisiana, and Mississippi and should be climatically adapted to all of the Southeast.

The plant was released for erosion control last year by the Mississippi Agricultural and Forestry Experiment Station and the Soil Conservation Service.

Studied at SCS's plant materials center in Coffeeville, Mississippi, over the last 10 years along with many other grasses, forbs, and shrubs for shoreline erosion control, Halifax maidencane appears to be the best plant for this job. It was originally collected south of Halifax, North Carolina. by former SCS plant materials specialist Karl E. Graetz.

Maidencane, *Panicum hemitomon,* is a native grass that grows from North Carolina south to Florida and west to Tennessee and around the Gulf Coast to Texas. Of the many ecotypes of this grass, Halifax maidencane was selected for shoreline planting because of its vigorous spreading habit and its tolerance to cold.

Among its other assets, Halifax maidencane grows across the waterline. It will grow at least 18 inches below the normal waterline and up the bank to about 36 inches above it. The plant is well adapted to lakes that have moderate water level fluctuation.

Because maidencane is extremely palatable, grazing animals must be closely managed or excluded to keep a heavy grass cover along the shoreline during the stormy season.

The shoreline above the maidencane must also be protected with a good vegetative cover, such as Pangburn switchgrass, bermudagrass, bahiagrass, or tall fescue. ♦

Halifax maidencane helps control erosion along the shoreline of this lake in northern Mississippi.

'Sleeping Giant' for Spencer

by Freddie L. Fields

District conservationist, SCS, Spencer, West Virginia

A city that has run short of water many times in recent years, Spencer, West Virginia, now has a "sleeping giant" ready to provide a reservoir of water and protect downstream areas from floods.

The "sleeping giant" is a recently completed dam built as a result of the Little Kanawha Resource Conservation and Development Project (RC&D). Construction of the dam was adopted as a measure by the sponsors of the RC&D project in west central West Virginia.

Earlier this year, the lake, filled with 500 million gallons of water, began flowing through the principal pipe spillway to the new water pickup station downstream. The 70 surface acres of water stored behind the 87-foot-high dam guarantee a year-round water supply to Spencer.

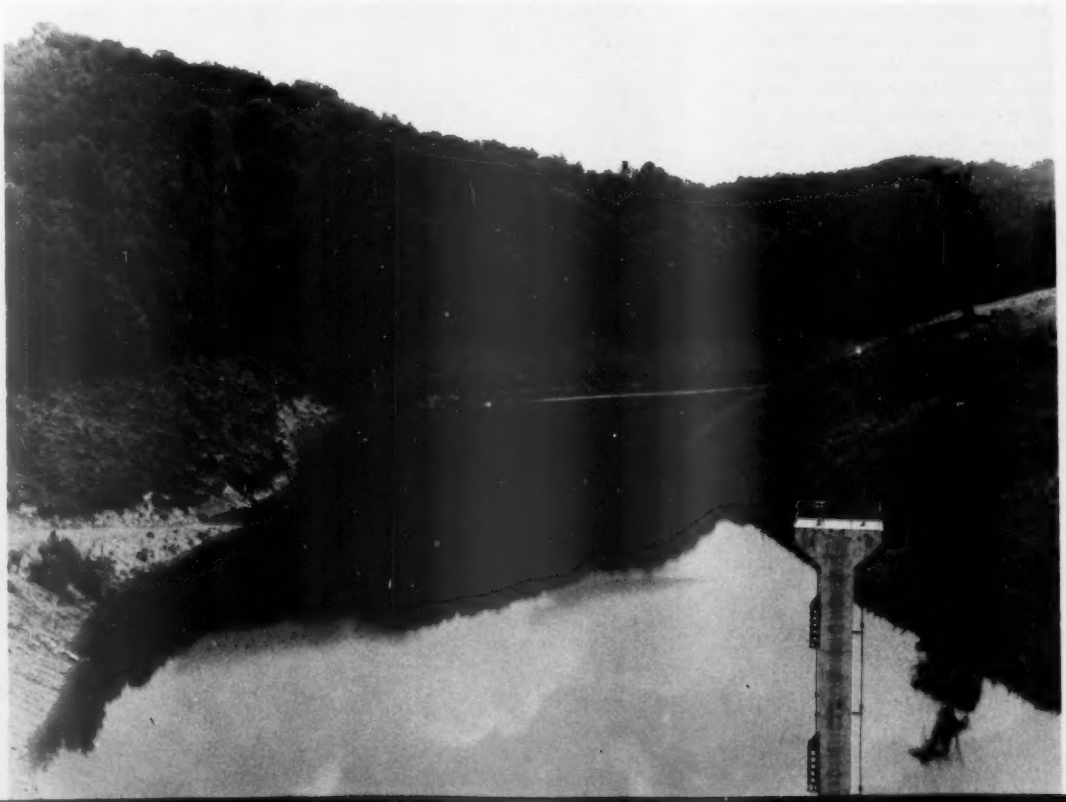
At present, Spencer provides water to nearly 1,200 individual customers, 153 commercial concerns, 3 industrial plants, and 20 public authorities. One new customer as a result of the new dam will be the Spencer State Hospital.

City officials expect future water needs will reach 1 million gallons per day compared with the current level of 600,000 gallons.

Rapid residential and industrial growth in the Spencer area had severely taxed the city's water supply in recent years. Dependent on two Mile Tree dams—with a capacity of 58 million gallons, the city frequently had to take emergency actions to conserve water.

The first work to locate a new water supply began about 10 years ago. The Soil Conservation Service, under Public Law 566, studied a number of potential dam sites in the upstream area for both flood control and water storage. The

The Charles Fork Dam near Spencer, West Virginia, begins to fill.



study focused upstream from Spencer in the upper reaches of the Spring Creek watershed. This area was the source of periodic floodwaters which inundated the lowlands, including residential sections of the city.

The eventual site of the dam on Charles Fork, a tributary of Spring Creek, met the city's needs for water storage and contributed to flood protection. It was close to Spencer and had relatively few families in the area, simplifying relocation problems.

The Economic Development Administration, U.S. Department of Commerce, financed the project, and the Soil Conservation Service RC&D, under its technical assistance program, reviewed the plans and provided inspection during construction. The dam was completed and began storing water in June 1974.

Additional financing was provided by the Economic Development Administration for the city to upgrade its water treatment, storage, and distribution facilities and also to buy the Spencer waterworks from the West Virginia Water Company. ♦

Above, at left, is the riser which now serves as the principal pipe outlet for the dam. Below, workmen spray a mixture of grass and legume seeds and water following construction.

Flooding such as this will be reduced by the dam, which will hold back flood water and release it gradually downstream.

'Midnight Oil Burned'

Conservation With LTA's in Iowa

by Bill Willis

District conservationist, SCS, Atlantic, Iowa

New concepts or programs can be tough to get started, but they're much easier if you've got excellent cooperation, a forward-looking public, and you're willing to put forth some extra effort.

We found that to be the case with the new long-term cost-sharing agreement program last year. Forty-three landowners in Cass County wanted to sign long-term agreements (LTA's) after they understood how the program could help protect their rolling hills from erosion. This was the highest figure of any county in Iowa.

A hastily organized publicity program announced the new approach to applying the complete conservation package through LTA's. Paul Peterson, county executive director for the Agricultural Stabilization and Conservation Service (ASCS) in Atlantic, devoted a paragraph to the LTA's in a newsletter. We then organized a brief afternoon meeting to explain the program to a dozen landowners who had demonstrated active interest in conservation work. From there, the word spread at sale barns, coffee shops, across fences, and otherwise "by word of mouth."

April was designated as the sign-up period. A few applications became several and soon became dozens. April was also corn planting time in Cass County, so midnight oil burned in the USDA offices for many nights while 43 farmers identified their conservation needs.

Placing priorities on 43 applications is a tremendous job. After many hours of Soil Conservation Service time in setting priorities, the ASCS County Committee spent considerable time establishing the order for processing the requests. Eight Conservation Plans of Operation (CPO) were prepared and signed as agreements, using the available cost-share funds.

The eight CPO's, when completed, will result in eight erosion control structures, 12 acres of grassed waterways, and 161 acres permanently converted to improved pasture. More than 21 miles of terraces will be built, most of which will have grassed backslopes and tile outlets. Conservation tillage practices will be carried out on nearly 900 acres of cropland. A total of 1,185 acres of cropland will be protected to within allowable soil losses on these eight farms. Wildlife needs were also included by insuring that 22 acres of food and cover areas would be established, protected, or maintained.

The combination of land use and treatment decisions determine how much work must be done. One plan was prepared on a 160-acre pasture farm that needs some reseeding and a change in the management system. This farm needs about $8,000 total investment in erosion control practices. Some other farms, where intensive use of cropland is planned, need nearly $20,000 in cost-share money alone.

The Cass County Soil Conservation District (SCD) and the local ASCS office have supported the use of the long-term agreements.

"We have pledged to supplement the ASCS program by picking up 25 percent of the cost of practices on LTA's without state cost-share funds," according to George Hosfelt, chairman of the Cass County SCD.

"We'll do this as long as we have the money because we feel LTA's are a good way of getting the complete job done."

The State of Iowa, through the Department of Soil Conservation, has appropriated cost-share funds for conservation work for the last 2 years.

"We will need about $90,000 in cost-share funds through this office over the next 8 years to carry out our responsibility," Peterson said. "Our longest contract will run the full 10 years that we are allowed."

Royce Kitelinger, a young farmer operating 200 acres of

his own and renting additional cropland, comments on his LTA by saying: "It works out well to set up a farm as a whole for a conservation system."

Another young farmer who has entered into an LTA is Jerry McCrory. He operates two tracts of his own land near the town of Cumberland as well as his father's farm and does custom work. McCrory considers the welfare of future farmers important. "We've only got one soil, and we've got to save it for future generations. We can't grow soil like we grow a corn crop."

People matched with conservation practices, technical know-how linked with some financial assistance, and long-term agreements are the essential ingredients to produce the complete conservation package. ♦

More than 21 miles of terraces will be built in Cass County through LTA's signed last year.

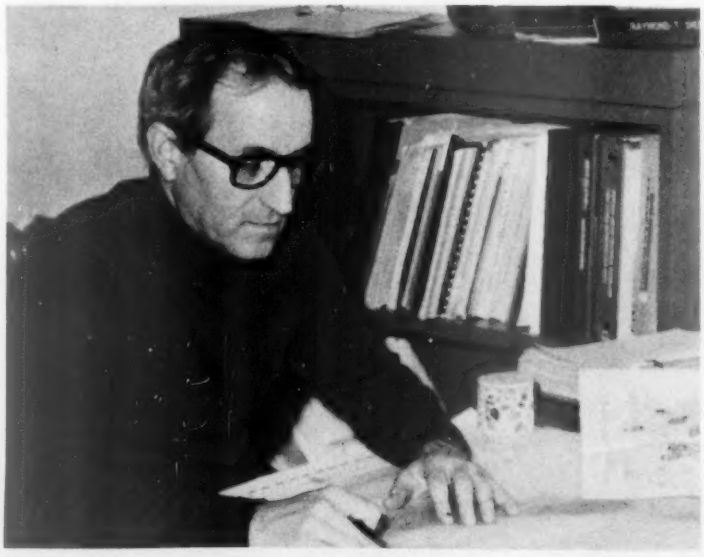
IPA=Imaginative,

by Verlon K. Vrana
Director, Personnel D

More than ever before, the Soil Conservation Service is working with and assisting state and local units of government. Much of this assistance is done under a new tool in public administration, the Intergovernmental Personnel Act, or IPA.

The IPA, enacted by Congress in 1970, enables federal employees to be detailed temporarily to universities and state and local governments and specifies conditions under which nonfederal personnel may be detailed to federal agencies. Salary costs are shared, in many cases on a 50-50 basis.

To date, SCS has assigned more employees to work under the IPA than any other agency in the U.S. Department of Agriculture. Thirty-two states and two technical service centers have participated in the 154 assignments made by SCS since the start of the program. Several states have had seven or more assignments, including California, Florida, Idaho, New Mexico, New York, North Carolina, Pennsylvania, South Dakota, Virginia, and West Virginia.



SCS's Raymond Diedrick was on IPA assignment to the Twin Cities Metropolitan Council.

Overall, more than 1,500 federal employees have received IPA assignments. USDA has led all other federal agencies, with a total of 260 employees working or having worked under the IPA. The length of IPA assignments varies, although it usually does not exceed 2 years.

SCS employees who have participated in this work represent many disciplines, including engineering, soil science, soil conservation, economics, geology, biology, and range conservation, agronomy, and other plant sciences.

Assignments are quite varied. For example, in California 10 SCS employees are working for other units of government under the act. One, an engineer, is advising the California State Water Quality Control Board on technical problems of agricultural pollution. A plant materials specialist, assigned to the California Division of Highways, is investigating plant materials for use on various state highway projects. And a soil conservationist is serving as an assistant regional director of the Santa Barbara Region, California Coastal Zone

actical Assistance

SCS, Washington, D.C.

Commission, to help develop a regional land use plan for the South Central Coast.

For the SCS employee assigned to another level of government, the work is often difficult. Goals and procedures are often hard to understand at first. A soil scientist or conservationist may find that everyone around him is really a layman when it comes to soil science or conservation—and may discover that *he's* really a layman when it comes to public health, transportation, or urban planning!

But if IPA work is challenging, it's also rewarding and may result in invaluable assistance to a state or a region. For example:

The *Montana Department of State Lands (DSL)* needed top professional help when it was directed by the state legislature to review reclamation plans submitted by mining companies and then approve mining operations.

The Department turned to SCS via the IPA. An SCS plant materials specialist, Ashley Thornburg, was detailed to the Department for 15 months on a part-time basis. Another SCS plant materials specialist, James A. Olsen, was also detailed to the Department.

Besides accelerating the rate at which the Department could approve the plans and projects of mining companies, these two IPA assignments improved SCS-DSL relations. Theodore Schwinden, Montana Commissioner of State Lands, sees a benefit to both agencies. "The entire field of reclamation in the West is brand-new," he said, "Both Mr. Thornburg and Mr. Olsen assisted us immensely in developing our program. On the federal side, as the federal government moves more toward programs in strip-mine reclamation, these men will have already had practical experience in existing state programs like our own."

The Twin Cities Metropolitan Council is a regional commission developing a comprehensive plan for the seven county Minneapolis-St. Paul region of Minnesota. "We needed short-term, very technical help in relating soils to urban development," explained the council's Director of Environmental Planning, Frank Lamm.

Under the IPA, SCS assigned

Richard H. Gilbert, SCS soil scientist, works at Purdue University's Laboratory on Application of Remote Sensing.

In Montana, James A. Olsen, plant materials specialist for SCS, works for the Montana Department of State Lands in reviewing reclamation plans.

soils expert Raymond Diedrick to work for the Metropolitan Council. Diedrick reviewed all available technical soils information and then prepared a soils guide that could be understood by planners and developers. He also applied his soils expertise in reviewing project plans and referrals from towns in the region.

In addition, he prepared several other guides and maps relating soils to land use. Lamm noted particularly that Diedrick developed a sewage disposal/soils analysis that has been extremely helpful to the staff in understanding what kinds of soils can result in septic tank problems and why.

Purdue University's Laboratory on Application of Remote Sensing secured the services of SCS soil scientist Richard H. Gilbert as manager for a National Aeronautics and Space Administration grant project to deliver remote sensing satellite data to user agencies within Indiana.

M. F. Bumgardner, program leader of the Earth Sciences Research Program at Purdue, considers it "particularly rewarding to have valuable inputs from a soil scientist who has had many years of field experience with the Soil Conservation Service. He has done a marvelous job in educating appropriate groups in state and local government to the potential applications of remote sensing in resource management."

To date, SCS has assigned more employees to work under the IPA than any other agency in the U.S. Department of Agriculture.

Gananda, New York, is a 10,000-acre new community with a projected population of 85,000 to 120,000 people. It will have a major impact on the Rochester area, presently the fastest growing urban area in New York State. SCS soil conservationist Richard Zimmerman was assigned under an IPA agreement to the Genesee-Finger Lakes Regional Planning Board to serve as a staff environmentalist for the Gananda project.

In this position, Zimmerman has worked on a variety of projects and plans, including noise pollution controls, soil erosion control during construction, and water quality. "It's tremendously rewarding work," he said, "and this is something that absolutely had to be done."

The Alaska Department of Natural Resources turned to the IPA to get an experienced plant materials specialist to help set up the Department's new plant materials center in the Matanuska Valley.

SCS plant materials specialist James B. Stroh—as manager of the Alaska Plant Materials Center—was assigned to establish the physical facilities for the center, develop the plant testing and production program, project that program over a 10-year period, and train the professional staff. In addition, Stroh does some plant collection, evaluation, and development work.

Every species of native Alas-

"We needed short-term, very technical help in relating soils to urban development," explained Frank Lamm of the Twin Cities Metropolitan Council.

The Montana Department of State Lands needed top professional help when it was directed by the state legislature to review reclamation plans submitted by mining companies

kan plant is eligible for inclusion in the program with the exception only of mosses, lichens, and algae. Selective species not native to Alaska are being included, with special emphasis on plants from Canada, Scandanavia, and the Soviet Union.

The center will support Alaskan seed and plant industries by providing to commercial producers foundation seed and planting stock of all released plant varieties. In addition to conservation plants, these will eventually include forest trees, grains, forage plants, vegetables, fruits and ornamentals.

The Tennessee Department of Public Health needed to develop regulations for subsurface sewage disposal and knew that soils data could be used to determine which areas would successfully accommodate such systems. To get technical help in interpreting soils data for the new regulations, the Department turned to the IPA. James Ault, director of the Department's Environmental Sanitation and Soil Waste Division, explained that "SCS is about the only place where we could get a trained soil scientist."

SCS soil scientist Charles Powers provided technical assistance first in writing the new regulations, approved by the Tennessee legislature last July, and then trained local health department personnel in the new regulations. Powers also served as a technical expert, advising the state on difficult problems.

The Bureaus of Community Environmental Control and of Land Protection, both in Pennsylvania's Department of Environmental Resources and both in need of technical help in soil science, teamed up to get the services of an SCS soil scientist through the IPA.

The soil scientist, Jay Weaver, trains sewage enforcement officers in a nine-county region around Pittsburgh on soil identification and interpretations. He also reviews plans for sanitary landfills, sewage and sludge disposal, coal refuse disposal and other environmental and community projects presented to the Department of Environmental Resources. "IPA is a desirable thing," Weaver said. "The Waste Division would like its own soil scientist but couldn't afford one. As for me, I've been mapping soils for 23 years, and the IPA makes it possible for me to apply the knowledge that I have. It's challenging, because I have to do more learning in areas such as soil mechanics."

As the examples above illustrate, it's clear that one of the best ways SCS can serve the public is through our newest management opportunity—the IPA. ♦

A Two-Way Street

The Soil Conservation Service not only assigns personnel to other agencies under the IPA, but receives valuable help from specialists assigned to SCS under the act. The University of Maine's Robert Rourke was assigned to the Upper Darby Technical Service Center in 1972 to determine what combinations of soil characteristics (primarily soil texture) could be used to estimate the liquid limit and plasticity index of a soil. His results can be used by Maine and by SCS throughout New England. The resulting engineering data provide vital information on whether a given soil can support buildings and roads.

Russell Pope, a senior water resource planner with the Wisconsin Department of Natural Resources (DNR), was assigned to SCS to work on the Wisconsin River Basin Study as of last December. His work typifies how the IPA can help SCS. He communicates to SCS the desires of Wisconsin state agencies concerning the river basin study (for example, DNR is interested in non-point sources of pollution) and can help SCS collect information by locating data already obtained by the state. For example, DNR had been doing mapping work on shoreland use and access; SCS learned of this work through the IPA, and the DNR mapping supplemented SCS evaluations of recreation potential. SCS carries out sediment studies at selected sites; through Pope's coordination, SCS will also take water samples at these sites, and DNR will analyze the samples in its laboratory for various parameters of interest to biologists from both agencies. Although Pope concentrates on the Wisconsin River Basin, other aspects of SCS work such as the P. L. 566 program, will also benefit, and DNR expects that the assignment will help both agencies in other parts of the state as well.

Shoreline Erosion Inventory In North Carolina

by Stanton Harrell

Soil conservation technician, SCS, Edenton, North Carolina

If you should visit a typical river or sound in northeastern North Carolina on a normal summer day, you would probably be struck by the tranquility of the scene. You might also come to the conclusion that these shorelines have remained largely unchanged since the days of the early English colonists. You could be wrong on both counts.

Although the waters are usually tranquil, they often become battering rams of destruction when angered by strong winds. And the destructive action of these waters has caused tremendous erosion along miles of unprotected shoreline.

Lloyd Overton, Sr., a retired farmer, has been watching this type of shoreline loss in Chowan County for more than 30 years. "I can remember when the annual Sunday School picnic was held in my yard, bordering Albemarle Sound, under two elm trees that stood 50 feet from the bank," he said.

The sound has marched inland, and the trees are gone with the tide.

Overton also remembers going to Drummonds Point with his father to buy fish. A boiler house used by fishermen to haul in their seines stood 500 feet out from the shoreline. Now all that remains are two old boilers that can be seen only at low tide.

Owners of waterfront property, well aware of the destruction wrought by wind and water, are fighting the effects of erosion that takes its toll in lost land every year. They have called on the Soil Conservation Service for assistance. To help, SCS began by starting an inventory on the amount of shoreline lost to erosion over the past 30 years in 11 eastern North Carolina counties. The effort will be expanded to cover all coastal counties in North Carolina.

The results are sometimes startling, ranging from negligible losses up to several hundred feet—a severe loss of shoreline. The Leigh farm on Albemarle Sound, located at the mouth of Little River in Perquimans County, has lost more than 250 linear feet along a 5,500 foot expanse of sound shoreline over a 31-year period. This amounts to more than 36 acres of good farmland and resulted in the deposit of 278,437 tons of sediment to pollute the vital estuaries of Albemarle Sound.

A man who qualifies as an expert on shore erosion—

Over a 31-year period, 36 acres of prime farmland on the Leigh farm in Perquimans County, North Carolina, have been lost to Albemarle Sound.

through personal observation and interest—is Hoyle Jones, a farmer in the Durants Neck section of Perquimans County.

"There have been periods of anxiety living here," he recalls. "During Hurricane Hazel in 1954 the bank was melting away like butter. I lost 50 feet in one day's time."

In 1955, for protection of his dwelling, Hoyle Jones moved his house some 200 feet back from its previous location. Today, with erosion continuing, the house is less than 150 feet from the waterfront.

To obtain scientific data on shoreline loss, the Soil Conservation Service is using aerial photos made 30 years ago and comparing them with up-to-date ones. In addition, SCS people are conducting inspections on the sites to determine the heights of banks and other factors. Data on exposure, soil type, land use, and other factors will be used to determine the exact cause of shore erosion and factors affecting the rate of erosion.

The total dollar loss from shore erosion is difficult to assess. There is the loss of valuable land, plus the value of timber, crops, and sometimes even a dwelling or other building. But how do you assess the damage done when quantities of mud settle on the bottom of a productive estuary, polluting this natural environment? How much does it cost to remove this sediment and overcome the damage done by pollution?

These questions are awaiting an answer.

It is known, from surveys already completed in 11 counties, that a total of 6,143 acres were lost during the 30 year period of the study. This resulted in 30 million tons of sediment pollution.

Farmers and other landowners in northeastern North Carolina are concerned about pollution of estuarine waters, and wondering about the effects on sedimentation pollution on fish and other marine life, on aquatic vegetation, on wildlife in general, and the effects this natural destruction will have on the total ecosystem in years to come.

Since they are concerned about quality of the environment, they are working to preserve it. The Soil Conservation Service is working closely with them toward the mutual objective. ♦

Although expensive, groins and bulkheads such as these in Chowan County, North Carolina, are effective in helping control shore erosion.

Molybdenum-toxic areas are often at mountain footslopes. Here, soil samples are being taken and will be described for each site.

The Poisoned Cattle of Willow Creek

by Joe Kubota

Research soil scientist, SCS,
U.S. Plant, Soil, and Nutrition Laboratory, Ithaca, New York

Peter Jackson had a problem.

Jackson is a Montanan with a ranching operation that spreads from Willow Creek to irrigated uplands where he grows most of his alfalfa. His problem was that his cattle did poorly when grazed on the wet bottom lands of Willow Creek.

A veterinarian, called in by Jackson, suspected that the cattle suffered from copper deficiency. The vet tried to correct the deficiency with injections of copper glycinate and, sure enough, the animals improved.

Most ranchers would have given their cattle copper supplements and left it at that, but Pete Jackson is hardly a typical rancher. He had been a director of the Montana Association of Conservation Districts and had served on the Grass Conservation Bureau of the Montana Board of Natural Resources and Conservation. He produces most of his animal feed and

closely watches both animal performance and forage crop production to obtain maximum returns from his ranching operation.

Jackson's observations of poor animal growth when grazed in certain areas are not unusual. Not all forage crops grown are equally nutritious to animals and studies are made to identify where and why such areas occur. The Soil Survey Investigations Division of the Soil Conservation Service cooperates with the U.S. Plant, Soil, and Nutrition Laboratory, Agricultural Research Service, and Cornell University in these studies.

Willow Creek has many characteristics of areas that produce forages with excessive amounts of the trace element molybdenum (Mo) in the presence of normal amounts of copper. Jackson's cattle were actually suffering from molybdenum poisoning, for which supplemental copper is a simple therapy. Too much molybdenum induces copper deficiency in the cattle. Molybdenosis and molybdenum poisoning are common terms for this problem.

A polyvalent metallic element, molybdenum resembles chromium or tungsten in many of its properties. As a hard silver-white metal, it is useful to man in strengthening and hardening steel.

As a trace element in plants and animals, however, the beneficial role of molybdenum depends on how much is present. Plants need Mo in the enzymatic reduction of nitrate. Most common plants will grow and mature if they have, on an oven dry weight basis, about one part per million (ppm) of Mo—roughly a few hundredths of an ounce per ton of dried plant material.

With animals, molybdenum plays a more vital role, being tied to the biochemical utilization of copper. Exactly how molybdenum and copper affect each other is not known, but it is certain that an imbalance in these two elements means trouble. Whereas too much molybdenum induces copper deficiency, too little molybdenum induces copper toxicity, if copper levels are high. Molybdenum poisoning is a more common problem in the United States than is molybdenum deficiency.

Cattle suffering from molybdenosis grow poorly and have faded hair coats, foul-smelling feces, and profuse diarrhea.

Excessive Mo does not show up in reduced plant growth, however, because plants are tolerant to greater concentrations of the element than animals.

The first intensive study to determine the distribution of molybdenum-toxic areas and soil characteristics was made in Nevada in the early 1960's. E. A. Naphan, the SCS state soil scientist, provided the stimulus to get this study underway.

From the study, it was discovered that one can identify soils that produce molybdenum-toxic forage plants. Exceedingly large amounts of molybdenum were found in alluvial soils formed in granitic alluvial fans. But not all soils with high molybdenum caused toxic levels in forages. Only plants that grew on wet parts had 20 ppm or more of molybdenum, a level that causes molybdenosis.

Subsequently, plants grown in the greenhouse showed that they take up more molybdenum when grown in wet than in dry soils.

Studies in Baker Valley, Oregon, confirmed the Nevada findings and also showed why molybdenosis is not a problem on flood plains of large rivers. The soil Mo content of the Powder River flood plain was uniformly low, but it was quite variable on flood plains of tributary streams. Only when

Effect on Man?

Scientists know a good deal more about how molybdenum affects plants and grazing animals than they do about the element's effects on man.

Studies of milk in several states indicate that molybdenum levels in unprocessed milk increase in a molybdenum-toxic area, sometimes to 100 micrograms of Mo per liter of milk. But while this tends to explain why Mo toxicity is often strongly reflected in calves, we drink milk which has been mixed at the dairy from many farms.

Certainly, the plant and animal components in our food chain provide a safety factor for people, since deficiencies or excesses of molybdenum would show up in plants and animals before they could affect us.

On the positive side, dental researchers have discovered that children born and raised in areas of high molybdenum have fewer decayed, missing, or filled teeth than children of comparable ages outside of these areas. Studies in New Zealand, England, and Hungary report that molybdenum in the presence of comparable levels of fluoride helps reduce dental decay rates.

LEGEND

GENERAL LOCATION OF RELATIVELY BROAD AREAS OF HIGH (>10 TO 100 PPM) MOLYBDENUM FORAGE PLANTS ASSOCIATED WITH INCIDENCE OF MOLYBDENOSIS.

LOCALIZED AREAS, PRINCIPALLY ISOLATED ALLUVIAL FANS, SWALES AND DEPRESSIONS, OF HIGH MOLYBDENUM PLANTS.

AREAS WHERE GENERAL BACKGROUND LEVELS OF MOLYBDENUM ARE MODERATELY HIGH IN SOILS AND PLANTS.

PRINCIPAL MOUNTAIN RANGES.

PRINCIPAL RIVERS.

a tributary stream deposited a large amount of molybdenum were levels high enough.

Because of similarities in landscape, geology, and soils, the Oregon and Nevada studies suggested that problem areas might also occur in Washington, Idaho, Montana, Wyoming, and Colorado, even though molybdenosis was not a generally recognized problem of livestock production in those states.

State SCS offices in the five states were contacted; the SCS offices in turn contacted agricultural experiment stations to obtain what was known about Mo toxicity. In truth, not much was known about it.

Next, soil survey maps and geologic maps were evaluated with the soil survey staff to select likely areas for investigation.

It was at this stage of the study that molybdenum poisoning was located on the Jackson ranch in Montana. Plant samples were shipped to the U.S. Plant, Soil, and Nutrition Laboratory in Ithaca, New York. They showed that the amount of Mo in legumes was well within the toxic range for grazing animals, while grasses had appreciably less of the element.

Samples were collected the first year from only two sites on the Willow Creek flood plain—the Jackson Ranch and a neighbor's ranch downstream. The findings were sufficient to provide the basis for intensive sampling the following year. In this manner, the geographic extent of high molybdenum soils was delineated to cover the 10-mile extent of Willow Creek.

As in Oregon and Nevada, a significant feature was that forage plants grown on well-drained soils did not have toxic amounts of Mo. Most of the forage on these soils is harvested as hay and is not grazed. Molybdenum in hay is less toxic than is molybdenum in fresh forage but the reason for this difference is not known.

The distribution of the molybdenum-toxic areas now recognized in the West is shown in Figure 1. The Florida Everglades is the only area east of the Rockies where excess molybdenum is known to be a problem. In the West, the distribution pattern is consistent with the combined role of physiography, bedrock, and soils that give rise to Mo-toxic areas. "Yellow calf disease" in Hawaii is also due to excess Mo, but the rock-soil-plant pattern there is different, with volcanic ash as the dominant soil-parent material and soils at higher elevations moist most of the time—and consequently behaving as wet soils in western bottom lands.

The molybdenum study illustrates how soil survey information can be applied to solve some aspects of problems in animal nutrition. The information about bedrock, surficial geology, vegetation and management practices, routinely noted by soil scientists, represents collectively an enormous body of information.

At right, a healthy calf; at left, one suffering from molybdenosis.

The study of soil-related problems in animal nutrition is one of the types of research being pursued at the U.S. Plant, Soil, and Nutrition Laboratory. The multidisciplinary staff at the laboratory includes biochemists, chemists, plant physiologists, and animal nutritionists, as well as soil scientists. Each studies trace-element behavior from a different point of view, seeking to establish biochemical roles of trace elements, the mineral requirements and factors that affect their availability to plants and animals.

The work of the laboratory becomes increasingly important as changes in land use result in changes in trace-element cycling and environmental quality. Information gained through research such as the molybdenum study provides a means to establish natural background levels of trace elements, and factors that affect them. As man changes the world around him, science needs to know the ranges of trace-element concentration that exist in natural soils. ♦

In the Spring of 1935 . . .

The nation's second great duststorm in less than a year swept eastward across the Nation on March 6, 1935. Clouds of topsoil from fields of Kansas, Colorado, Texas, and Oklahoma darkened the skies of eastern seaboard cities and those of the Atlantic Ocean.

That same month the Soil Erosion Service, with its 39 erosion control projects and its assigned 51 Emergency Conservation Work erosion camps, was transferred to the U.S. Department of Agriculture from the Interior Department by the Federal Emergency Administrator for Public Works. The transfer was approved by President Franklin D. Roosevelt on March 25, 1935.

On March 27, 1935, the Secretary of Agriculture directed the unification of the Department's activities pertaining to soil erosion under the Soil Erosion Service, making the transfer effective April 1. Without a single dissenting vote, both houses of the 74th Congress passed what became Public Law 46 —the establishing and enabling act of the Soil Conservation Service. It was signed by the President on April 27, 1935. The same day, the Secretary of Agriculture issued Departmental Memorandum 673 establishing the Soil Conservation Service in the Department of Agriculture. It provided that the new agency include the activities conducted under the SES and designated Hugh H. Bennett as the agency's chief.

Recon...

Silt in a blizzard. An estimated 50,000 tons of silt from as far away as Nebraska and the Dakotas were deposited on one Minnesota county during the dust storm accompanying the "blizzard of the century" in January. The Douglas County Soil and Water Conservation District estimated the tons of silt by marking off an area in the snow, melting it, weighing it, and computing the amount deposited in the county during the January 10-11 storm.

Pipeline to pipeline. The Soil Conservation Service is providing information for the environmental impact statement for the Arctic Natural Gas Pipeline Project. SCS offices along the route are contributing technical data for the statement, primarily on soils and vegetation. E. F. Sedgley, state resource conservationist for SCS in Colorado, is on loan to the U.S. Department of the Interior to assist with the statement. Recently, 15 North Dakota SCSers put together data, requested by Sedgley, on principal soil series and major range sites, with descriptions, known historical-archaeological-unique scenic sites, and corrections in indicated land use along the proposed pipeline route through North Dakota. Sedgley notes the 48-inch high pressure pipeline will extend from the North Slope of Alaska through Canada to Monchy, Saskatchewan, where it splits and continues to Delmont, Pennsylvania, in the East and to Los Angeles in the West.

Protection to livestock. Windbreaks and shelterbelts in South Dakota provided protection that kept livestock losses to a very minimum during a blizzard described as the worst since 1884, reports SCS State Conservationist V. W. Shally. The January blizzard swept across parts of the state, with more than 27 inches of snow falling at Huron during the month. Livestock losses are estimated at more than $2 million.

Some 44,000 landowners and operators in North Dakota recently received a copy of a new 4-page pamphlet telling of the protection afforded by windbreaks and shelterbelts.

The Soil Conservation Service in North Dakota developed the forestry pamphlet, "Tree Plantings Have Many Environmental Benefits," and took care of the mailing costs. The cost of the publication was shared by the Lincoln-Oakes Nurseries and the North Dakota soil conservation districts.

Soil surveys

Idaho

Minidoka Area. By Harold L. Hansen. 1975. Soil Conservation Service in cooperation with University of Idaho College of Agriculture and the Idaho Agricultural Experiment Station. 72 pp., illus.; maps.

Kentucky

Menifee and Rowan Counties and Northwestern Morgan County. By Peter E. Avers, Jarrell S. Austin, John K. Long, Paul M. Love, and Carl W. Hail. 1974. Forest Service and Soil Conservation Service in cooperation with Kentucky Agricultural Experiment Station. 88 pp., illus.; maps.

Minnesota

Douglas County. By Donald E. DeMartelaere. 1975. Soil Conservation Service in cooperation with Minnesota Agricultural Experiment Station. 112 pp., illus.; maps.

Texas

Swisher County. By Wayburn D. Mitchell, Louis L. Jacquot, and Billy R. Chance. 1974. Soil Conservation Service in cooperation with Texas Agricultural Experiment Station. 45 pp., illus.; maps.

Ward County. By William H. Dittemore, Jr., and Ervin L. Blum. 1975. Soil Conservation Service in cooperation with Texas Agricultural Experiment Station. 50 pp., illus.; maps.

West Virginia

Brooke, Hancock, and Ohio Counties. By Walter J. Ellyson, Merrill Kunkle, Joseph D. Ruffner, and John Webb. 1974. Soil Conservation Service in cooperation with West Virginia University Agricultural Experiment Station. 62 pp., illus.; maps.

New Publications

Seeds of Woody Plants in the United States. *1974. C. S. Schopmeyer, Technical Coordinator, USDA-Forest Service. Agr. Hbk. 450. 883 pp., illus. $13.60.*

This 883-page volume is a completely rewritten and greatly expanded successor to the *Woody Plant Seed Manual*, published in 1948. The first section of the reference book covers general principles and methods of seed production, processing, and germination. The second section provides specific handling methods and data for more than 800 species in 188 genera of commercial and ornamental trees and shrubs.

More than 100 Forest Service scientists and an equal number of cooperators in government, industry, and universities were involved in a 5-year effort to produce this reference volume.

Meetings

April

26	*Nature Conservancy, Washington, D.C.*
27–29	*Sixty-third Annual Meeting Chamber of Commerce of the United States, Washington, D.C.*
27–May 1	*National Association for Community Development, Portland, Ore.*
28–May 1	*Garden Club of America, Washington, D.C.*

May

3–4	*Sierra Club, San Francisco, Calif.*
4–7	*National Forest Products Association, Washington, D.C.*
11–14	*National Forest Products Association, Washington, D.C.*
15–16	*Southern Forest Institute, Inc., Panama City, Fla.*
18–22	*American Institute of Architects, Atlanta, Ga.*
18–23	*National Council of State Garden Clubs, Inc., Salt Lake City, Utah.*
20–23	*International Association on Great Lakes Research, Albany, N.Y.*
29–30	*Southern Forest Institute, Inc., Biloxi, Miss.*

June

1–4	*Twenty-second National Watershed Congress, Portland, Ore.*
8–12	*General Federation of Women's Clubs, Washington, D.C.*
8–13	*American Water Works Association, Minneapolis, Minn.*
15–19	*Air Pollution Control Association, Boston, Mass.*
16–20	*American Geophysical Union, Washington, D.C.*
18–20	*Twelfth National Agricultural Plastics Conference, Atlantic City, N.J.*
22–25	*Sixty-eighth Annual Meeting of American Society of Agricultural Engineers, Davis, Calif.*
22–25	*National Association of Counties, Honolulu, Hawaii*
23–25	*American Plywood Association, Vancouver, Canada*
24–28	*Association of Consulting Foresters, Greenville, Me.*
26–27	*Southern Forest Institute, Inc., Asheville, N.C.*
29–July 3	*American Seed Trade Association Convention, Houston, Tex.*
30–July 3	*National Environmental Health Association, Minneapolis, Minn.*

July

3–8	*National Education Association, Los Angeles, Calif.*
13–17	*Seventy-fifth Annual Meeting of American Society of Landscape Architects, San Antonio, Tex.*
19–23	*American Association of Nurserymen, Inc., Chicago, Ill.*
20–24	*National Federation of Business and Professional Women's Clubs, Inc. of the USA, Las Vegas, Nev.*

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